sence or absence of combined water, are next described. These sometimes produce crystals composed of two opposite sectors of a circle, united at the centre; at other times, they exhibit irregular elongated shapes, having a stem, either subdivided at both extremities into minute diverging fibres, or abruptly truncated; and occasionally they present regular geometric forms: but, whatever be their shape, they undergo, in general, spontaneous changes in the course of one or two days after they have been formed.

The author then notices a property belonging to some crystals, similar to that possessed by the tourmaline, of analysing polarized light; for which reason he denominates them *analytic crystals*. As an example, he mentions those obtained by dissolving sulphate of chromium and potash in tartaric acid by the aid of heat. A drop of this solution, placed on a plate of glass, soon yields, by evaporation, filmy crystals, which frequently have this property. The plumose crystals of boracic acid, when crystallized from a solution of borax in phosphoric acid, also possess this analytic power, and present very beautiful appearances when viewed with the polarizing microscope. Another instance occurs in the oxalate of potash and chromium, a salt whose optical properties have been investigated by Sir David Brewster. If gum arabic be added to a solution of this salt, and a drop of it be put between two plates of glass, a very beautiful arborescent, but microscopic crystallization takes place, composing a multitude of minute prisms, growing, as if by a species of vegetation, and variously arranged in sprigs and branchlets, often resembling in miniature, the tufts of marine confervæ. A similar plumose appearance, accompanied with the same analytic properties, is obtained from the evaporation of a drop of a mixed solution of nitre and gum arabic. This analytic effect is shown to be the consequence of the high degree of doubly refractive power possessed by these crystalline filaments, and which exists even in those whose diameter is evanescent on microscopic examination. The author entertains hopes that it will be possible to obtain large and permanent artificial crystals, which may possess the advantages of the tourmaline, without the inconvenience resulting from its dark colour.

December 22, 1836.

FRANCIS BAILY, Esq., V.P. and Treasurer, in the Chair.

William Page Wood, Esq., was elected a Fellow of the Society.

"First Memoir on the Theory of Analytical Operations." By the Rev. Robert Murphy, M.A., F.R.S., Fellow of Caius College, Cambridge.

The author considers the elements of which every distinct analytical process is composed, as of three kinds; the first, being the *sub-*

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ject, that is, the symbol on which a certain notified operation is to be performed; the second, the *operation* itself, represented by its own symbol; and the third, the *result*, which may be connected with the former two by the algebraic symbol of equality. The operations are either *monomial* or *polynomial*; *simple* or *compound*; and with respect to their order, are either *fixed* or *free*. He uses the term *linear* operations to denote those of which the action on any subject is made up by the several actions on the parts, connected by the signs *plus* or *minus*, of which the subject is composed; and these linear operations likewise may be monomial or polynomial.

A variety of theorems for the developement of functions of a very general nature are then deduced from expansions of the fundamental expressions, derived from the principles stated in the beginning of this memoir: and various laws embracing the relations subsisting between analytical operations, and the fundamental formulæ for their transformation are investigated.

"Observations and Experiments on the Solar Rays that occasion Heat; with the application of a remarkable property of these rays to the construction of the Solar and Oxy-hydrogen Gas Microscopes." By the Rev. J. B. Reade. Communicated by J. G. Children, Esq., Sec. R.S.

The method employed by the author for obtaining, by a combination of lenses, the convergence to foci of the colorific solar rays, together with the dispersion of the calorific rays, consists in making a beam of solar light, which contains both kinds of rays, pass, after it has been converged to a focus by a convex condensing lens, through a second convex lens, placed at a certain distance beyond that focus: that distance being so adjusted as that the calorific rays, which, from their smaller refrangibility, are collected into a focus more remote from the first lens than the colorific rays, and consequently nearer to the second lens, shall, on emerging from the latter, be either parallel or divergent; while the colorific rays, which, being more refrangible, had been collected into a focus nearer to the first lens, and more distant from the second, will be rendered convergent by this second lens; so that the second focus, into which they are thus collected, will exhibit a brilliant light without manifesting any sensible degree of heat. The light so obtained may be advantageously applied to the solar, and to the oxy-hydrogen microscopes, from its producing no injurious effects on objects inclosed in Canada balsam, or even on living animalcules exposed to its influence.

Another improvement in the construction of the microscope employed by the author, consists in the cell for holding objects being made to move quite independently of the field glass; so that the best focus is obtained by an adjustment which does not disturb the field of view.

The Society then adjourned over the Christmas vacation, to meet again on the 12th of January next.